Geophysical Research Abstracts
Vol. 18, EGU2016-2361, 2016
EGU General Assembly 2016

Multi-stage evolution process of large scale landslides at the Patanpunas stream, Taiwan

Ming-Lang Lin (1), Kuo-Chen Lee (2), Chia-Ming Lo (3), Meng-Chia Weng (4), and Shun-Min Lee (2)

(1) Department of Civil Engineering, National Taiwan University, Taipei, Taiwan, R.O.C. (mlin@ntu.edu.tw), (2) Department of Geotechnical Engineering, CECI Engineering Consultant, Inc., Taipei, Taiwan, R.O.C. (f93521113@gmail.com), (3) Department of Civil and Disaster Prevention Engineering, National United University, Miaoli, Taiwan, R.O.C. (ppb428@yahoo.com.tw), (4) Department of Civil and Environmental Engineering, National University of Kaohsiung, Kaohsiung, Taiwan, R.O.C. (mcweng@nuk.edu.tw)

This study used multi-temporal terrain and remote sensing images to investigate the geomorphological evolution of the Putanpunas stream caused by large-scale landslides over the last decade. We conducted an analysis of the landslides evolution process within the study area, which included a multi-temporal terrain analysis, remote sensing interpretation, surface displacement analysis, and mechanism investigation. By integrating the results from these analyses, we provided explanations for the topographic and geomorphologic action processes of the deep-seated landslides as well as the development of the potential collapsing mechanisms within the study area. Then, discrete element method was used to simulate the process of landslide movement and deposition.
The results show that the evolution process of large-scale landslides in the Putanpunas stream can be divided into four stages, namely downcutting of the stream gully and decompression of the river gully in the early stage, creep and deformation of the rock slope, sliding surface development of the deformed bands in the rock strata, and movement of the sliding mass. The results of terrain analysis and interpretation show topographical changes in the alluvial fan downstream and the deposits in the midstream and downstream segments of the Putanpunas Stream between 2005 and 2009. In 2009, torrential rainfall induced large-scale landslides that greatly altered the terrain of the Putanpunas Stream and the alluvial fan. There still exists 7.2 $\times$ 107 m3 of unstable colluvium accumulated at the slope surface and stream gully within the upstream and midstream areas. In 2012, further large-scale landslides turned the colluvial layer into debris flows that cut across the Ryukyu Terraces downstream to the downstream segment of the Laonong Stream to the southwest. This greatly changed later debris flows and alluvial fan deposits.

Key Words: large-scale landslides, multi-temporal terrain, remote sensing, discrete element method